A Clear and Prescient Danger: Validation & Vision for Marine Electronic Warfare

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PREFACE

The purpose of this paper is to offer a vision for the future of Marine Corps Electronic Warfare. I have two goals. First, I wish to tie together a wide range of related issues in such a way as to illustrate some dangerous inconsistencies regarding where the Marine Corps intends to move doctrinally for the next two decades. These inconsistencies are serious enough to threaten the independent self-sufficiency of the Marine Air-Ground Task Force – a situation that will endanger our expeditionary culture as Marines. Second, I hope to demonstrate that the unique capabilities of electronic warfare offer part (and only part) of the solution.

This paper argues for Marine EW, for not EA-6B's, Radio Battalion, or any other parochial community interest. However, it does represent the frustrations of a career spent flying EA-6B's, recognizing the value of non-kinetic fires and the cultural indifference given to it outside of the EW community.

No intellectual journey like this can begin without the support and mentorship of others. This paper really began four years ago as an instructor in Yuma serving for LtCol Richard Bew. Our three years in Arizona mark the most challenging and rewarding experience of my career thus far. I also could not ask for a finer mentor than LtCol Frank Kelley. His experience, knowledge, and counsel represent the lion's share of intellectual weight behind this paper. My time with Col J. Kevin Dodge was invaluable, helping to establish the context I had searched for so long to find. Most important is the debt of gratitude that I owe to my most ardent supporter, my wife Jenifer. Her patience and superhuman ability to multi-task afforded me the time I required to compose this paper. Her moral support has been critical to this paper since I began the effort so long ago.

EXECUTIVE SUMMARY

Title: A Clear and Prescient Danger: Validation & Vision for Marine Electronic Warfare

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Thesis: In order to preserve its expeditionary culture, the Marine Corps must embrace Electronic Warfare *institutionally*, while maintaining a *comprehensive EW expertise* which organically completes *D3A* (Decide/Detect/Deliver/Assess), yet leverages non-organic resources in order to manipulate the transfer of information, to influence perceptions, and to affect an adversary's ability to make and act on decisions.

Discussion: *Inconsistencies* – The Marine Corps will blend the science of NCW to its philosophy of maneuver warfare through distributed operations. The technical & tactical focus of DO fails to capture the philosophical implications of the Corps' commitment to irregular warfare where victory at the moral level presents unique demands on a military.

Additionally, the global explosion of the commercial IT market will have significant consequences for future Marine operations by expanding the potential audience for IO and by providing future adversaries access to offensive and defensive information capabilities that will challenge America's historical information superiority.

Threat – Unless the Marine Corps embraces a mind-set that seeks to aggressively manipulate the EM spectrum, the MAGTF will lose its self-sufficient freedom-of-action due to a dependency on outside services and organizations for information dominance.

Requirement – the Corps requires organic ground-, air-, and space-based systems capable of conducting EA, ES, and EP. It should focus on conducting tactical EA by cultivating a broad expertise, investing in tactical EW systems, and leveraging the vast array non-organic capabilities that will represent the majority of the Corps' EW effort.

Recommendations: *Technical* – The USMC should invest in technology reflecting the following capabilities: *diversity* (manned/unmanned, ground/air, ES/EA); *interoperability* (facilitate mutual support); *open architecture* (capacity to upgrade via "plug-&-play"); remote *operation/reprogrammability* (enhance fires deconfliction); *coupled ES/EA* (sensor-shooter capability); and, *deployability* on any size MAGTF.

Organizational – PP&O (PLI) should remain the focal point for a single EW vision. IO and EW functions must reside with MCCDC's Fires and Maneuver capability steward. MCCDC must also re-evaluate how it folds EW into broader doctrinal and warfighting publications. MCSC should create a new IO program group: PG-17. Finally, the Marine Corps should invest in EW by reorganizing its resources into MEF EW Regiments that will provide the benchmark for integrated EW capability across DoD.

Institutional – Marines must embrace EW institutionally such that the use of non-kinetic fires becomes as intuitive as the employment of kinetic fires. This mind-set will have the tangible effect of allowing Marines to dominate the EM spectrum (with organic and non-organic resources) in order to preserve the operational freedom-of-action that is demanded for forcible entry and DO. More important, this mind-set encourages the increased breadth of options available to Marines in irregular war, where the application of force at the physical level can undermine mission success at the moral level.

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INTRODUCTION

TAKING THAT FIRST STEP IN A LEAP OF FAITH

In order to understand and accept the observations, warnings, and recommendations of this paper, I offer you a challenge. If your appreciation of the Marine Corps' expeditionary culture is more than academic and you believe in the ethos which underlies that culture, then I dare you to open more than your mind because the arguments in this paper build on an intangible and emotional foundation. This is not a petty demand for electronic warfare in the Marine Corps. It is a forewarning that without institutional change now, the Corps' expeditionary culture is in jeopardy. But before we delve into the complexities of electronic warfare, you must first appreciate the qualities it shares with artillery. Recognizing the similarities and differences between electronic warfare and artillery will align our perspectives so that you may evaluate the merits of my arguments, conclusions, and recommendations.

Marine Corps Artillery and the Value of ***Expertise***

Across the entire service, Marines understand why and how to employ artillery. While they may not be experts, Marine commanders appreciate how important it is that artillery remains integrated into a scheme-of-maneuver in order to maximize the effect of combined arms. The experts themselves – the fire support coordinators – are not experts in *all* of the forms of indirect fires that they integrate. Few, if any, fire support

coordinators are experts in firing mortars, artillery, armor, and rockets, while also experts at flying fixed-wing and rotary-wing close air support. It is their fundamental *understanding* of fires, and their *expertise* at integrating them that supercedes any lack of familiarity they may have with particular systems. But even more basic than that, while no one can quantify how effective each exploding artillery round is at eroding the will of each enemy combatant, every Marine has *faith* that the application of force through the integration of fire and maneuver will have decisive effects on the battlefield. Marines aggressively employ non-organic fires in support of organic forces because they recognize the value of combined arms *as an institution*. This recognition drives the Corps' requirement for a *cadre of experts* capable of coordinating fires married to a force structure capable of identifying targets, delivering fires, and assessing effects – encapsulated by the Marine Corps' targeting methodology of *Decide-Detect-Deliver-Assess* (**D3A**). These capabilities directly contribute to the effectiveness of the Marine Air-Ground Task Force (**MAGTF**), which deploys with organic indirect fire support, but also includes the expertise and structure to integrate non-organic resources that may be more useful than its own equipment.[1] A critical aspect of the Corps' expeditionary culture is its organic fires expertise which allows the MAGTF to outsource capability without surrendering the means to achieve D3A, thereby optimizing effectiveness, minimizing cost, and contributing to the increasing demand for "jointness" within the Department of Defense (**DoD**).

[1] An example of such a resource is the US Army's M39 Army Tactical Missile System (ATACMS) which exceeds the capability of Marine organic artillery. For unclassified specifications, visit the Federation of American Scientists (FAS) website at http://www.fas.org/man/dod-101/sys/land/atacms.htm. FAS website accessed on 07 May, 2005.

The Requirement for Electronic Warfare – Background

Future warfare theories and emerging doctrinal concepts both point to *inconsistencies* that exist between the increasing reliance on information superiority, and a cultural indifference towards Electronic Warfare. In consonance with its expeditionary culture which exemplifies combined-arms, the Marine Corps has an opportunity to redefine how EW supports the MAGTF while it pursues Transformation. Required changes must be cultural, not merely technical.

Thesis – A Requirement for USMC Electronic Warfare

In order to preserve its expeditionary culture, the Marine Corps must embrace Electronic Warfare *institutionally*, while maintaining a *comprehensive EW expertise* which organically completes *D3A* (Decide/Detect/Deliver/Assess), yet leverages non-organic resources in order to manipulate the transfer of information, to influence perceptions, and to affect an adversary's ability to make and act on decisions.

Key Issues Drawn from the Thesis

The focus of this paper is Marine Corps electronic warfare. Without institutional change, future EW requirements will threaten the Corps' expeditionary culture. But EW is not *the* solution, only part of it. *EW alone will not solve the inconsistencies identified in this paper*. However, EW will be a critical part of the solution. Other aspects of the solution lie beyond the scope of this paper.

Institutional change is worth the effort. Preserving the expeditionary culture benefits both the Marine Corps as well as all of DoD. The MAGTF is a strategic force

multiplier in part because it integrates capabilities within one organization that other services cannot. This ability to integrate poses a significant challenge because the synergy of combined-arms integration cannot be quantified. *Combined-arms integration provides a qualitative advantage* that cannot be measured, only demonstrated. The same qualitative advantage compels Marines to defend the benefits of the MAGTF only to those who have not witnessed one in action. Those unfamiliar with it do not appreciate the intangible power of a MAGTF's combined-arms integration. Institutional reforms will preserve the Corps' expeditionary culture by not only maintaining the MAGTF as a "Total Force-in-Readiness," but by setting a new standard at the same time for EW integration within DoD which other services can emulate.[2]

The enterprise of electronic warfare should not be reserved for experts. *Information is just another maneuver element.*[3] Maneuver warfare embraces a mindset that integrates fire and maneuver to shatter enemy cohesion. The integration of fire and maneuver is intuitive to Marines. In the same manner as Marine artillery, the Corps must maintain a cadre of EW experts, but the *institution* must understand and appreciate its capability. EW represents a form of fires that is intended to manage the transfer of information (maneuver). Without institutional appreciation by the Marines who will be fundamental to its integration, the true potential of EW will never be realized.

Due to the unique challenges and capabilities of operating within different mediums, the Marine Corps cannot afford to lose its *organic ground-based and airborne*

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[2] Headquarters United States Marine Corps, Marine Corps Strategy 21, (Washington, DC: HQMC, 03 November 2000), p. 2.

[3] This conceptualization is a result of discussions with Col J. Kevin Dodge on 22 April, 2005. The current commander of Headquarters & Service Battalion at MCB Quantico, Col Dodge served as the Deputy Assistant Secretary of the Navy for Research, Development, and Acquisitions; and he served in the Aviation Plans and Policy Department for the Deputy Commandant for Aviation.

EW expertise. One must apply the same rationale used for organic artillery and close air support within the Marine Corps. Losing either capability would represent a critical gap in combined-arms expertise that joint asset integration cannot adequately address.

The Marine Corps should focus its effort on *tactical Electronic Attack* (**EA**). Intelligence and force protection are supporting functions to fire and maneuver. While they play absolutely crucial roles in success, and may at times be the main effort, they do not win wars by themselves. A focus on EA in no way minimizes the importance of Electronic Warfare Support (**ES**) or Electronic Protection (**EP**). On the contrary, effective EA depends on both. But integrating fires is a complicated, yet critical discipline. A tactical EA mindset will drive requirements, acquisitions, and operations across the EW community.

Finally, this paper argues for a *comprehensive*, organic D3A capability, *not* for a *complete* capability. Comprehensive equates to organic ground, airborne, and space-based systems capable of conducting EA, ES, and EP. Possessing those capabilities will enable a degree of operational freedom-of-action and foster a breadth of EW expertise capable of effectively leveraging non-organic resources. An assumption of this paper is that the *preponderance* of EW *capabilities* will be non-organic, which reinforces why *organic EW expertise is so crucial*. In fact, the more reliant the Marine Corps becomes on non-organic resources, the more important that expertise becomes. But nurturing expertise requires resources. An organic, comprehensive capability will develop the expertise needed to then integrate the non-organic resources that will be crucial to success.

Into the Murkiness – Outlining a Methodology

Since they point to the very heart of the problem, this paper will first identify those *inconsistencies* which threaten the expeditionary culture of the USMC in the future. With the problem identified, this paper will offer a *vision* of what EW should look like by 2020. The *rationale* behind the vision will be folded in throughout the discussion so that the subsequent *recommendations* for how to turn the vision into reality make sense. Finally, this paper will highlight the potential *obstacles* that may impede the realization of that vision.

A Requirement for the Reader

As you finish the first step in this journey, remember my caution to you – true appreciation for the recommendations of this paper demands a degree of personal involvement that the typical detachedness of academic inspection will not provide. This is a complex subject that demands your understanding of the background before offering recommendations. Chapter 1, *Inconsistencies,* is long, but crucial to the argument. I ask for your patience reading it. The vision for Marine EW will not come until Chapter 2, followed by the recommendations in Chapter 3. With that done, let us begin to wade into the problem.

CHAPTER 1 – INCONSISTENCIES

CRISIS IN THE ETHER

Methodology – A Building Block Approach

The methodology of this chapter deserves special attention because the fundamental inconsistencies, which this paper will address, are complex and hint at issues beyond the scope of electronic warfare. The chapter begins by examining the nature of warfare, its changing character, and the emerging initiatives that balance the two. Evaluating those initiatives will lead to the first inconsistency. Following the examination of warfare in general, the analysis will proceed to clarify how electronic warfare, information operations (**IO**), and psychological operations (**PSYOPS**) should be conceptualized within the Marine Corps. Operating from a common understanding, the analysis can move on to assess the *physical* target of EW – information technology. With the groundwork laid, the chapter closes by identifying the two inconsistencies related to the MAGTF and Marine EW that threaten the Corps' expeditionary culture.

War – The Immutable and the Transitory

The *nature* of war – competition – remains unchanged. War is fundamentally a contest of wills. MCDP 1, Warfighting defines the essence of war as such:

> The essence of war is a violent struggle between two hostile, independent, and irreconcilable wills. War is fundamentally an interactive social process. The

> object in war is to impose our will on our enemy. Because war is a clash between opposing human wills, the human dimension is central in war.[4]

If war is fundamentally a contest of wills wherein the human dimension is central; and if psychology is the science of the mind and its behavior; then, logically, *psychology is fundamental to the nature of war*.[5] As such, neither the nature of war, nor the primacy of psychology in war will change. It is this element of psychology that adds to the complexity of warfare, because truly quantifiable metrics for success shall elude military planners and policy makers until machines can measure the human will.

The *character* of war does change, and technology is among the primary influences compelling that change. Fueled by the admonitions of futurists like Alvin Toffler, it is from the revolutionary advances in information technology (**IT**) that the "Information Age" receives its name.[6] The most sweeping impact of information technology on military thinking is embodied by the theories of Network-Centric Warfare (**NCW**).[7]

Network-Centric Warfare theory represents the philosophical foundation for military transformation. While information technology is the critical enabler for NCW, the emphasis of the term "network-centric" is on the ability *to* network, not on the capabilities of *the* network.[8]

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[4] Marine Corps Doctrinal Publication 1, Warfighting, (n.p., June 1997), 3-4, 13.
[5] Definition for "psychology" derived from Merriam-Webster Dictionary, online edition, under "Dictionary," accessed on MSN, 08 May, 2005, at http://www.m-w.com/cgi-bin/dictionary.
[6] While he did not coin the term, "Information Age," Toffler's theories (primarily in books such as Future Shock and Third Wave) helped to stimulate the intellectual effort that has been dedicated to the subject.
[7] In fact, Network-Centric Warfare is characterized as, "an emerging theory of war in the Information Age." Department of Defense, Office of Force Transformation, The Implementation of Network-Centric Warfare, (Washington, DC: GPO, 5 January 2005), p. 3.
[8] Ibid, p. 3.

Even though the philosophical emphasis is on the ability *to* network, the physical emphasis is on *the* network. With the increasing emphasis on "jointness," initiatives like the Collaborative Information Environment (**CIE**) and Dynamic Joint Intelligence, Surveillance, Reconnaissance (**ISR**) offer technical solutions that will enhance organizational improvements like the Standing Joint Force Headquarters (**SJFHQ**) and Joint Interagency Coordination Group (**JIACG**).[9] These changes are intended to provide an unparalleled degree of *shared awareness* to all who have access to *the* network, from the combatant commander to the small-unit leader. This shared awareness contributes to decentralized command and control. Consequently, decentralized command and vastly improved access to strategic/operational capabilities at the tactical level result in the increased blending of the strategic, operational, and tactical levels of war.

The three "Domains of Conflict" (Figure 1) illustrate NCW's perspective on warfighting. The physical domain relates to the spatial and temporal relationship of fire and maneuver. The cognitive domain focuses on more intangible issues such as leadership, morale, and unit cohesion. The information domain "is the domain where information is created, manipulated, and shared."[10] With NCW, networked forces attempt to gain a decisive advantage by exploiting the *interdependence* of the physical, information, and cognitive domains in order to outthink, outmaneuver, and overwhelm an adversary.[11] This methodology seeks to improve the traditional focus on only the physical and cognitive domains by viewing information as a decisive weapon that generates its own combat power while enhancing effects in the other two domains.

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[9] Ibid, pp. 48-9.
[10] Ibid, p. 20.
[11] Ibid, pp. 19-21.

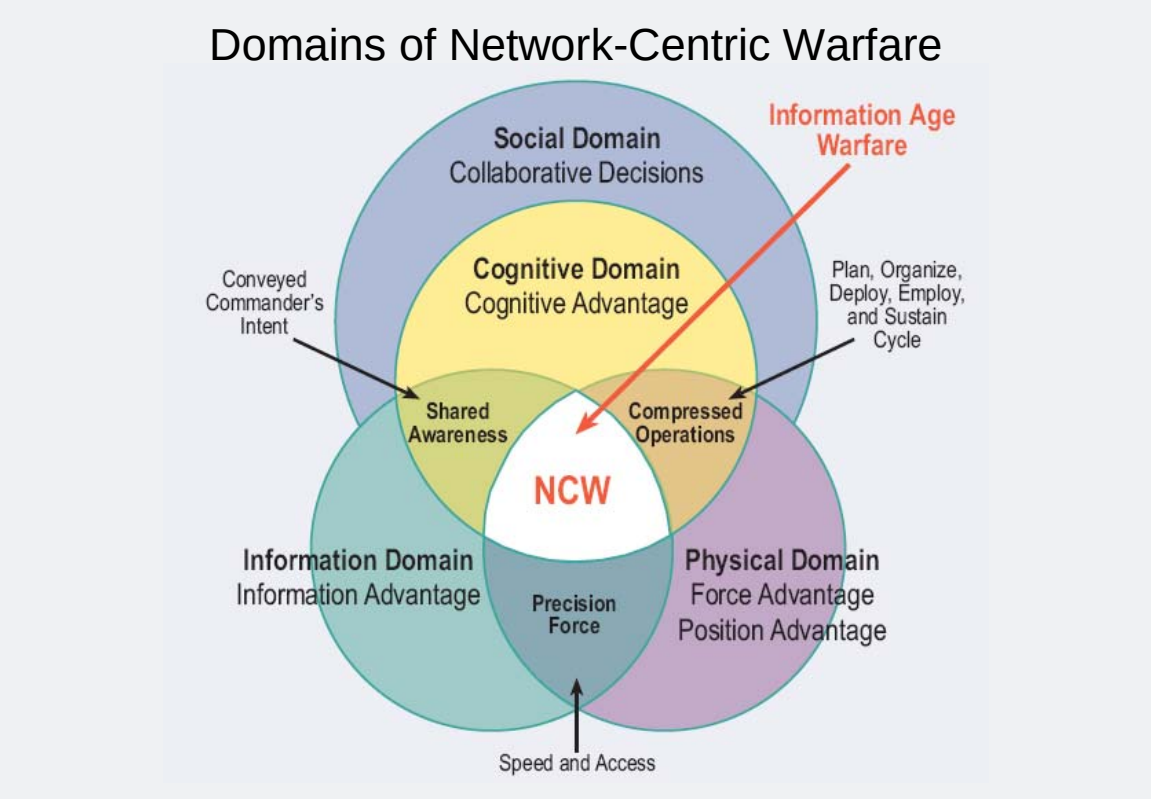

Figure 1 – Domains of Network-Centric Warfare[12]

The theories of NCW bring significant cultural implications. Much like IT itself which changes at an overwhelming rate, NCW redefines the role of *speed* and *mass* on the future battlefield. Previously stated, *information becomes an element of maneuver*. The speed, accuracy, and quantity of information (communications, sensors, targeting systems, etc.) help to redefine *mass* on the battlefield increasingly as *a function of precision, not volume*. Maintaining shared awareness with commander's intent will encourage rapid decision-making and innovation, producing a mind-set that seeks change and thrives in chaos – a mind-set that is fundamental to maneuver warfare. Speed of thought and action will generate tempo. Tempo will generate friction for an adversary. Tempo, friction, and precision will allow networked forces to outpace non-networked

[12] Ibid, p. 21.

adversaries. The technical and cultural recommendations of NCW already shape emerging doctrinal concepts within the Marine Corps.

Distributed Operations & Forcible Entry – The Application of NCW

The two priorities of the Marine Corps for the future are *irregular warfare* and *forcible entry* amphibious operations.[13] These two initiatives span the spectrum of human conflict. As a concept, Distributed Operations (**DO**) marries the capabilities of NCW with the Corps' tradition of maneuver warfare, mission tactics, and decentralized decision-making.[14] DO capitalizes on the advantage of dispersing infantry-rich units across an area of operations (**AO**), which distributes the risk associated with aggregated units. Currently the training emphasis for DO is to enhance basic soldiering skills – communications, call-for-fire, intelligence gathering, and patrolling.[15] Ship-to-Objective Maneuver (**STOM**) and Sea Basing will be key factors in minimizing the size of logistical footprints ashore, thereby improving small-unit mobility and contributing to security.

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[13] Opinion derived from three sources. The first is the update to the Commandant of the Marine Corps' 21ST Century Guidance, accessed online on 12 May, 2005, at http://www.mca-marines.org/leatherneck/hotnews.htm#CMCnew. The other two sources were interviews. The first was with Dr. Michael Bailey, Deputy Director of the Studies and Analysis Division at the Marine Corps Combat Development Command (**MCCDC**) on 03 May, 2005. The second was with Col Len Blasiol, Director of the Doctrine Division at MCCDC on 05 May, 2005. Both individuals agree that DO represents the most important initiative within Marine Corps doctrine at this time.

[14] Research on Distributed Operations comes primarily from three sources. "Distributed Operations: From the Sea," BGen Robert E. Schmidle, Marine Corps Gazette, Jul 2004, p. 37-41. The Marine Corps Warfighting Laboratory (**MCWL**) also posts two very worthwhile resources on its website. The first is, "Distributed Operations 2006, Capabilities and Enhancements Report as of 19 Jan 05." The other is, "Questions and Answers About Distributed Operations." Both documents were accessed on 09 May, 2005 at http://www.mcwl.usmc.mil/SV/SV_DO.cfm.

[15] The initial training for experimental DO units focuses on "the ability to communicate…employ supporting arms…conduct surveillance, and patrolling." "Distributed Operations 2006, Capabilities and Enhancements Report as of 19 Jan 05," p. 1.

Forcible Entry from the Sea is a Marine core competency that provides a unique capability to the DoD. Ship-to-Objective Maneuver in a forcible entry scenario represents a significant step in amphibious doctrine. With STOM, controlling territory at the beginning of operations in the rear-close-deep paradigm is not as important as controlling the "commons" – the sea, air, space, and cyber-space.[16] Advances in communications and transportation enhance the freedom-of-action required to achieve surprise at both the operational and tactical levels.

With NCW's emphasis on the ability *to* network, the shared awareness that comes with the CIE links physically dispersed forces. *The* network also gives small-unit leaders access to capabilities that were traditionally limited to larger headquarters. Not only do dispersed Marine forces help to distribute risk, they also serve a critical function for the joint force commander because they establish and maintain contact with the indigenous population – a crucial aspect of irregular warfare. This increased opportunity to interact with the indigenous population leads the discussion to another emerging theory of warfare – Fourth Generation Warfare.

Fourth Generation Warfare – A Step Forward into Devolution

Fourth Generation Warfare (**4GW**) approaches future war from a more philosophical perspective.[17] According to its advocates, 4GW signals a return to older, more primitive forms of warfare that predate the nation-state construct. *Unconventional* ceases to have meaning, as the *conventions of war* are no longer recognized. While the

[16] VADM Arthur K. Cebrowski, "Security Planning and Transformation," presented at the US Army Command and General Staff College, Fort Leavenworth, KS, 28 April 2004.
[17] William Lind, "Understanding Fourth Generation Warfare," in Military Review, Vol. 84 No. 5, (Fort Leavenworth, KS: U.S. Army Combined Arms Center, September-October 2004). Also find more information regarding 4GW at http://www.d-n-i.net/second_level/fourth_generation_warfare.htm.

intent of the author is not to offer personal opinions about it, one aspect of 4GW theory is particularly relevant to this paper – levels of war. Fourth Generation Warfare expands the current categorization of strategic, operational, and tactical levels by incorporating another dimension to the levels of war – physical, mental, and moral. This is similar, though by no means identical to the domains of NCW. The physical level of 4GW equates to the physical domain of NCW. The mental level of 4GW equates to the cognitive domain of NCW. *But NCW has no true corollary for 4GW's moral level.* In fact, 4GW's emphasis on this primeval undercurrent of future war challenges NCW's sterile, scientific, systems-based approach. Where as NCW "takes a step back" in order to view the interrelation of people and equipment as a system, 4GW refocuses the emphasis back on the individual and his will to fight. This is important to understand because tactical success on the physical level may result in operational defeat at the moral level using the 4GW construct.[18] *Winning at the moral level is the ultimate aim of 4GW*. Winning at the moral level is not just relevant; it is fundamental to future Marine doctrine. To understand why, brief homage must be paid to a dead German.

Carl von Clausewitz' "paradoxical trinity" remains relevant today.[19] Describing war as a "total phenomenon," Clausewitz characterized his Trinity as being:

> Composed of *primordial violence*, hatred, and enmity, which are to be regarded as a blind natural force; of the play of *chance and probability* within which the creative spirit is free to roam; and of its element of *subordination*, as an instrument of policy, which makes it subject to reason alone.[20]

It is this interplay of violence, reason, and chance that still rings true. Primordial *violence* and *subordination* offer a clean, scientific duality that is continually unbalanced

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[18] Ibid, p. 15.
[19] Carl von Clausewitz, On War, ed. and trans. by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), p. 89.
[20] Ibid.

by the play of *chance*. Some misconstrue the Trinity as consisting of the *people*, the *government*, and the *military*. While that may not have been Clausewitz' intent, ironically it is this characterization which offers better insight into the need for EW.

The application of force by military means remains the most extreme, yet relevant means of imposing one's will upon another, *so long as that other entity is a nation-state*. The government was the ultimate source of power in the Trinity. But in 4GW, the balance of power shifts to the *people*. Whether democratic citizens who empower the government, or tribal clans that wish to undermine the nation-state system, the people hold more power today than at any time in history. In such a case, compellence is not just a matter for politicians, but for the population writ large. This shift in power fuels the embers of insurgency around the world, and is illustrated by counterinsurgencies that focus on winning "hearts and minds." The moral level of war rises to preeminence due to this shift in power to the people.

The focus on the people reinforces a significant difference between NCW and 4GW particularly relevant to the Marine Corps. Winning war at the moral level means that military forces must be capable of more than force application. Irregular warfare requires operations that do not just span the spectrum of human conflict; they span the spectrum of human *contact* where winning "hearts and minds" will dictate military actions that *intentionally avoid* the threat or application of force (Figure 2). With this in mind, emerging doctrine must reflect that future military forces will conduct traditionally non-military operations in unstable environments that will contribute to political ends. Therefore, *full-spectrum operations* refer to the integration of all of the instruments of power – diplomatic, informational, military, and economic (**DIME**) – in order to gain

decisive moral advantage against adversaries.[21] Focused on scientific systems approach to warfare, NCW theories do not capture this moral imperative for irregular warfare, a fact which draws out the first inconsistency of this paper.

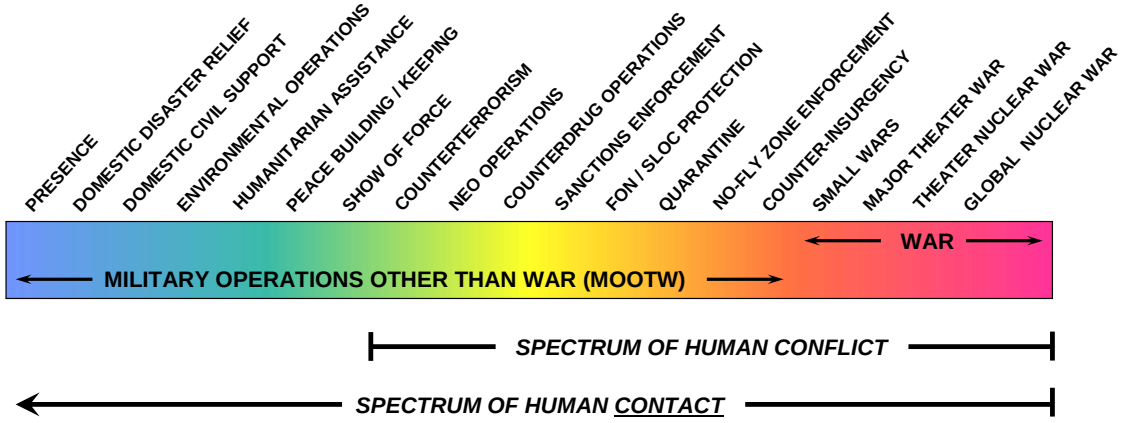

Figure 2 – Potential Missions for Future Marine Operations

Inconsistency #1 – Philosophical Foundations

Distributed Operations blends the advantages of Network-Centric Warfare into its existing traditions of maneuver warfare and mission tactics, but it *fails to capture the philosophical strengths of Fourth Generation Warfare which are so crucial to the Corps' future success in irregular warfare.* If the Marine Corps intends to push DO, it must ensure that the concept balances the requirements for irregular warfare and forcible entry operations. This requires a mind-set and skill sets that contribute to winning war at the moral level.

The Small Wars Manual states, "In major warfare, hatred of the enemy is developed among troops to arouse courage. In small wars, tolerance, sympathy, and

[21] David Jablonsky, "National Power," in U.S. Army War College Guide to National Security Policy and Strategy, ed. J. Boone Bartholomees, Jr., (Carlisle, PA: Strategic Studies Institute, U.S. Army War College), 101-17.

kindness should be the keynote of our relationship with the mass of the population."[22] Preparing Marines for DO by increasing communications capabilities and training small-units to call-for-fire is insufficient preparation for future operations.[23] Marines must deploy with the *psychological armament* to defeat an insurgency at its own game.[24] Marines must use all means available to establish and maintain contact with allies, adversaries, and non-combatants. *Electronic Warfare represents an important means of maintaining contact*. Not only can it enhance current capabilities, it is *universally applicable* to all missions, unlike the threat or application of force.

Psychological Operations, Information Operations, Electronic Warfare

One of the first arguments of this chapter was that psychology is fundamental to war. Figure 3 provides the current definitions for Information Operations and its five core competencies – PSYOPS, OPSEC, MILDEC, CNO, and EW. Three of these definitions require further clarification – PSYOPS, IO, and EW.

[22] Fleet Marine Force Reference Publication (FMFRP) 12-15, Small Wars Manual, (N.p. December 1990), p. SWM 1-17.
[23] The initial training for experimental DO units focuses on "the ability to communicate…employ supporting arms…conduct surveillance, and patrolling." "Distributed Operations 2006, Capabilities and Enhancements Report as of 19 Jan 05," p. 1.
[24] Friedrich Frhr. Von der Heydte, Modern Irregular Warfare, In Defense Policy as a Military Phenomenon, trans. George Gregory (New York, NY: New Benjamin Franklin House, 1986), pp. 40-2.

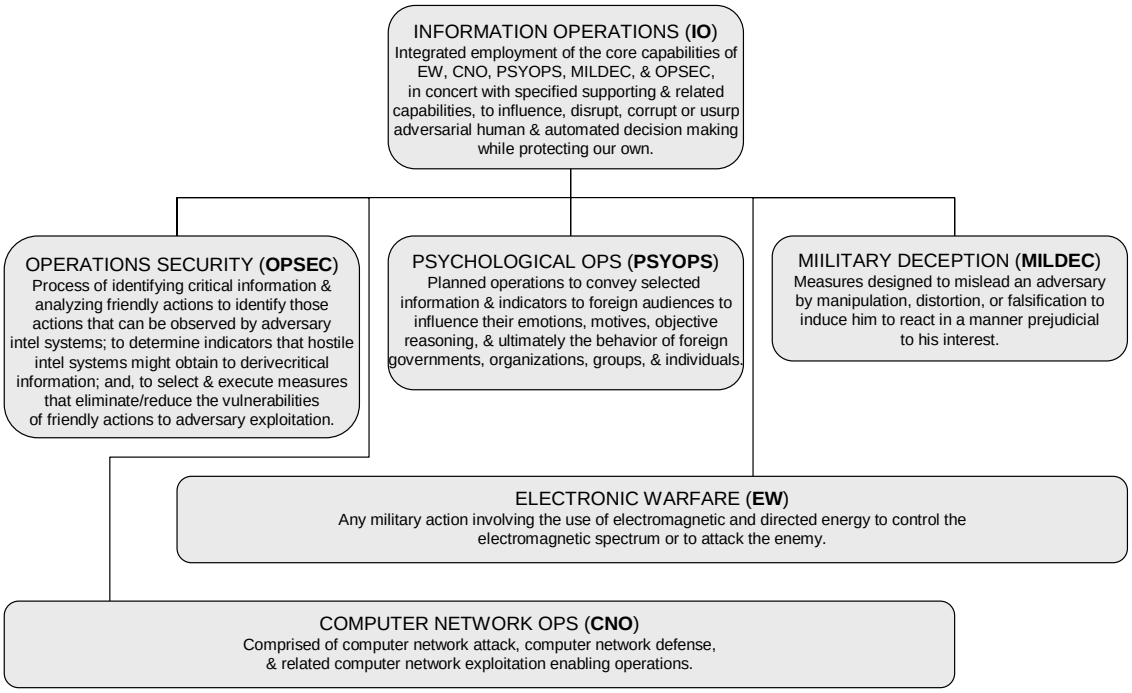

Figure 3 – Information Operations[25]

Psychological operations can be a misleading term because *all* military operations are psychological in nature since they involve the human element (which is central in war). The most important word in the definition is *influence*, because that is ultimately what the nature of war is about – influencing adversaries to submit to one's will. Yet as was already mentioned, militaries do not only conduct war; they conduct operations other than war, too. In this regard, psychology becomes even more complicated, yet more important when the aim of military operations is to persuade, coerce, or dislocate a target audience that may not all oppose the US (see Figure 4). In fact, persuasion may be the more relevant goal of military operations in irregular war. Distributed operations contribute to this goal by increasing human-to-human contact. But continual personal

[25] Joint Chiefs of Staff, Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, as amended through 30 November 2004, (Washington, DC: GPO, 12 April 2001), accessed 17 March 2005, at http://www.dtic.mil/doctrine/jel/doddict/index.html.

contact is not possible. Using information to maintain contact with an audience (friendly, neutral, or enemy) provides a subtle means of continuing actions to persuade.

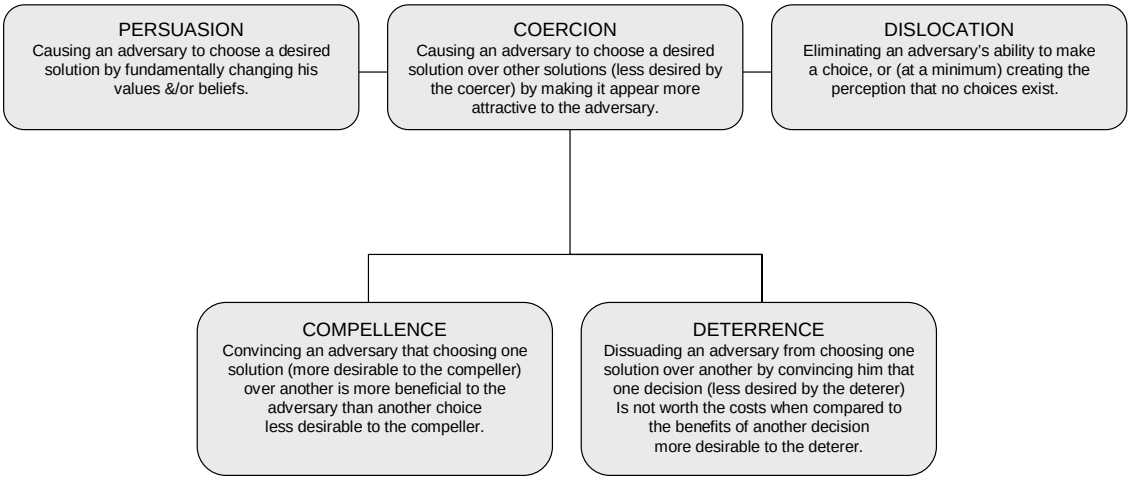

Figure 4 – The Intent of Psychology in Military Operations[26]

Information Operations is a catchall term applied to a collection of related activities. The common thread, obviously, is information. Viewing information as a maneuver element, information operations manage the transfer of information in order to enhance the speed of one's OODA cycle while inhibiting that of one's adversaries.[27] In other words, he who best exploits the information domain can gain a decisive advantage in the cognitive domain – the more subtle the means of managing information, the more effectively one persuades a target audience. Some of those *means* of persuasion, coercion, and dislocation relate directly to electronic warfare.

Electronic Warfare represents the means by which one intercepts, analyzes, and manipulates the EM spectrum (Figure 5). It represents some of the tools for conducting

[26] David E. Johnson, Karl P. Mueller, and William H. Taft V, Conventional Coercion Across the Spectrum of Conventional Operations: the Utility of U.S. Military Forces in the Emerging Security Environment, MR-1494-A, (Santa Monica, CA: The Rand Corp., 2002), 7-15.

[27] OODA cycle refers to the decision-making process of Observe – Orient – Decide – Act developed by Col John Boyd, who first introduced the process in his lecture, "Patterns of Conflict," December, 1986. Accessed via the Defense and the National Interest website at http://www.d-n-i.net/boyd/pdf/poc.pdf, accessed 11 May, 2005.

IO. Remember from the beginning of this chapter that information technology was the *physical* target. Electronic Attack is a direct-fire weapon that employs the indirect approach by manipulating the transfer of information in order to target the cognitive domain – the human mind.[28] It is a critical enabler for PSYOPS, CNO, MILDEC, and OPSEC. PSYOPS and MILDEC represent *ways* by which *means* such as EW and CNO achieve *ends*. Therefore, the utility of EW is limited only by the imagination of those employing it.

Similar to the unique capabilities of artillery and close air support, ground-based and airborne EW offer mutual support when properly integrated. *Proximity* is a function that both airborne and ground EW can exploit, but airborne EW is inherently more *mobile*. As a direct-fire capability, EA and ES are limited by line-of-sight (**LOS**) limitations. Aviation substantially reduces those LOS limitations, but does so at the cost of exposing assets to surface-to-air threats. Though not as mobile as airborne EW, ground-based EW maximizes persistence. Coupled with its proximity to the target, the inherent LOS limitations of ground EW can be advantageous with regard to *tactical* ES or EA.

[28] The term "indirect approach" is borrowed from B.H. Liddel Hart. B.H. Liddel Hart, Strategy, 2d rev. ed. (New York, NY: Praeger Publishers, Inc., 1975), pp. 333-46.

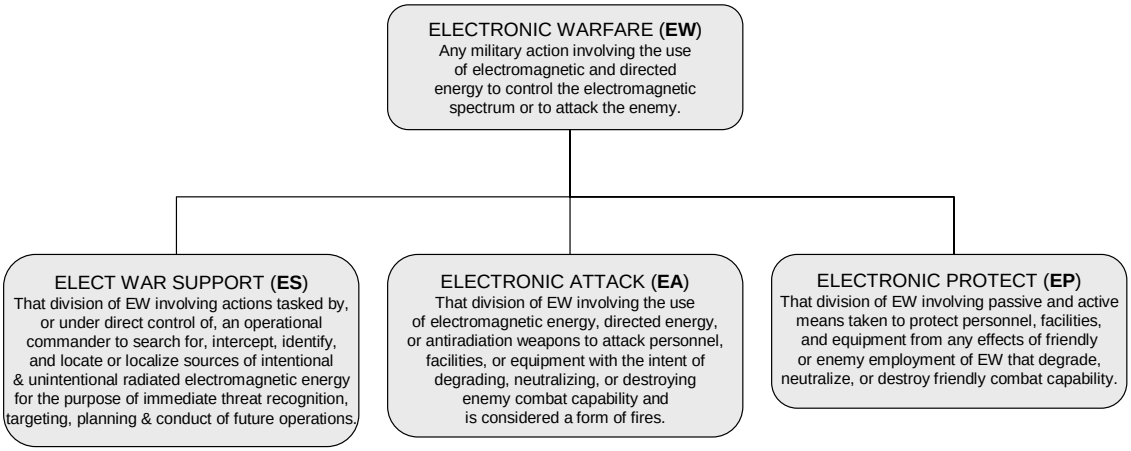

Figure 5 – Electronic Warfare[29]

Emerging Trends in Information Technology – Sensors and Communications

Electromagnetic sensors fall generally into three categories – RADAR, infra-red (**IR**), and electro-optical (**EO**).[30] Future trends in EM sensors point to the following qualities. In order to complicate both detection and intrusion, producers focus on *agility* (frequency, polarity, pulse), *coherence*, and *low-probability of intercept* (**LPI**). The equipment itself gets cheaper, smaller, and more mobile. Not only is there a greater emphasis on wireless networking, but also on integrating multiple sensors (RADAR, IR, EO) into one system. Cheaper and smaller technology means that these systems will be more readily available to national and transnational enemies. Integrated RADAR/IR/EO sensor suites increase the size of the threat spectrum. Improved mobility and wireless networks will increase autonomous operation. All of these capabilities significantly increase the lethality of threat systems because detection, identification, and reaction are severely complicated.

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[29] Joint Chiefs of Staff, Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, as amended through 30 November 2004, (Washington, DC: GPO, 12 April 2001), accessed 17 March 2005, at http://www.dtic.mil/doctrine/jel/doddict/index.html.

[30] Jane's reference http://www.janes.com/.

While military customers continue to drive the market for improved sensors, civilian consumers drive the communications industry. Consumers demand faster, smaller, cheaper, and more powerful (i.e. increased processing) information technology.[31] The massive increase in consumer volume drives the IT market to seek wider frequency ranges and to use existing bandwidth more efficiently.[32] The explosion of multiple access technology creates more demand for better encryption techniques in order to provide improved security and privacy. Consumers also require more wireless capability. The impact of this exploding consumer IT market is monumental.

Access to information is addictive. The increase in wireless technology and the emphasis on increased capability with a corresponding decrease in size and cost will mean that access to IT will explode globally over the next two decades. This explosion will have several consequences particularly relevant to this paper.

First, the growing consumer IT market produces a *larger audience* that can be influenced by manipulated information. This capability will prove crucial to operations at the moral level. Second, cellular adversaries who recognize that networked forces work better than non-networked forces will naturally use IT to a larger extent. Enemies of the US will protect themselves by gravitating to existing civilian IT architecture. Capitalizing on the growing civilian infrastructure, adversaries will "hide in plain sight," using standard encryption and multiple access technologies to complicate collection, exploitation, intrusion, and denial.

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[31] Analysis of future trends in commercial IT derived from a presentation given by Motorola's Executive Vice President and Chief Technology Officer, Padmasree Warrior. "Motonext." Presented by Padmasree Warrior at 2004 Europe, Middle East, and Africa (EMEA) Industry Analyst Meeting, 2004.

[32] CDMA (Code-Division Multiple Access), TDMA (Time-Division Multiple Access), and OFDM (Orthogonal Frequency Division Multiplexing) represent only several techniques used in commercial wireless IT systems today. For definitions of these, and other IT terms, visit TechWeb IT Encyclopedia website at http://www.techweb.com/encyclopedia/.

IO use EW to take advantage of the vulnerabilities of information technology. Information operations seek to exploit the information domain in order to gain decisive cognitive advantage. NCW recognizes the advantages of dominating the information domain, yet it fails to capture the fundamental essence of future military operations – victory at the moral level. Still, it is when attempting to connect trends in IT with the Corps' expeditionary culture where an additional inconsistency rises to the surface.

The Marine Corps' Expeditionary Culture – a Unique Ethos

The Marine Corps' history of expeditionary operations can be traced back to its origin, predating the modern amphibious doctrine which many view as its defining characteristic. This history engenders a culture that welcomes rapid deployment to austere environments. As an institution, Marines encourage innovation. Systemic equipment shortfalls foster a mindset that embraces resourcefulness, adaptability, flexibility, and efficiency. Combined-arms stand as perhaps the truest testament to this mindset because the *integration* of diverse capabilities provides multiplicative effects on the battlefield that cannot be empirically quantified.

An organic, combined-arms capability facilitates freedom-of-action. It permits a MAGTF to be a *total* force-in-readiness. Freedom-of-action enables strategic flexibility and speed in execution, returning the discussion to the artillery analogy from the introduction. Marines understand how to employ kinetic fires. No one can quantify the effect of each round, shell, or bomb on the will of every combatant, but Marines recognize that the systematic application of fires is crucial to victory in conventional conflict. The Marine Corps' ability to maintain a cadre of fires experts, along with the

structure to organically complete D3A gives it a decided edge over any adversary. The expertise and structure also enable Marines to integrate Joint fires to their own scheme-of-maneuver. The MAGTF does not need a complete fires capability. It deploys with a *comprehensive, combined-arms* capability, and covers resource gaps by leveraging its expertise to incorporate non-organic capabilities. Ironically, this institutional appreciation for combined-arms integration applies only to kinetic fires. Yet without a comparable non-kinetic combined-arms capability, the independence of the MAGTF will be in question, thereby threatening the Corps' expeditionary culture.

Inconsistency #2 – <u>Information Dominance</u>

The Marine Corps' fickle commitment to tactical EW (ground and air) represents a dangerous contradiction between what the Corps requires and what it seeks. .Marines must dominate the information domain by controlling their own networks and exploiting those of the enemy in order to preserve the strategic flexibility of the MAGTF in forcible entry operations and irregular warfare. The resources do not have to be organic, but the expertise does.

Information *dominance* (not control) is an achievable goal that is worth the effort. Enemies will attempt to find and exploit weaknesses, leveraging the civilian infrastructure, which affords greater sanctuary and camouflage. In addition to the inherent security of civilian architecture, ready access to commercial EW equipment will allow enemies to challenge the US in historically protected areas, namely the information domain. NCW's reconceptualization of *mass* as a function of speed, precision, and timeliness hinges on information superiority. With the renewed emphasis placed on

surprise and tempo, operations must gain and maintain cognitive advantage in the OODA fight. An astute adversary can already recognize this.

The inability to dominate the information domain will not only impair the strategic flexibility of the MAGTF by creating a dependency on Joint resources and expertise; it will also limit the physical freedom-of-action in both the air and at sea which is so critical to STOM in a forcible entry operation. Information technology will neutralize the operational flexibility of STOM if the "commons" cannot be dominated by Marine units, placing the MAGTF at the mercy of those Joint assets who can provide the required support.

The most potent threat to Marine forces in STOM will come from land-based air defense systems – surface-to-air missiles (**SAMs**), anti-aircraft artillery (**AAA**), and man-portable air defense systems (**MANPADs**). IT favors the defense because it is increasingly accessible, and getting more difficult to correlate and counteract. Sensors betray actions, and communications distribute information, both of which undermine the potential for surprise. Without generating the psychological dislocation one achieves with surprise, an adversary begins to react. Air defense systems are much cheaper to maintain than robust air forces. Without the intent or ability to challenge the US in the air, *integrated* air defense systems (**IADS**) will not be required. Distributed air defense systems *can* network, but *do not have to* network if identified aircraft are enemy. The availability of autonomous, networked, and lethal air defense assets will pose a prohibitive risk to forcible entry operations.

Impact – the Corps' Expeditionary Culture: Crisis in the Ether

To preserve its expeditionary culture, the Marine Corps must have the organic means to protect its forces and outmaneuver its enemies physically and cognitively. STOM gets Marines to the fight rapidly and with the smallest logistical footprint possible. DO frames a method for conducting future operations including irregular war. Victory comes to the opponent who recognizes that success is not purely a matter of force and therefore uses all means available to persuade allies and non-combatants, and to coerce or dislocate adversaries in order to win at the moral level. The tools are important, but *the expertise is mandatory*. Tactical airborne EW (EA, ES, and EP) will be a critical enabler for STOM, particularly in forcible entry operations. Tactical ground-based, airborne and space-based EW will be critical enablers for Distributed Operations. Based on the fundamental role of psychology which pervades the spectrum of potential missions, Information Operations will take combined-arms integration to the next level by coordinating kinetic and non-kinetic fires. Marines' understanding of EW must become intuitive in the same manner it is for kinetic fires. A commitment to a comprehensive, organic, tactical EW capability must be made to preserve the independence of the MAGTF (Figure 6). The Marine Corps requires a ground-, air-, and space-based force that conducts EA, ES, and EP using organic and non-organic assets (3-dimensional axes in Figure 6). Changes to Marine EW must not only balance emerging service doctrine with joint requirements; it must also minimize increases to existing EW force structure while remaining fiscally plausible (the "box" defined in Figure 6). The Corps cannot assume away an expertise by counting on other services that do not share the same EW requirements. *Outsourcing its EW expertise will foster a dependency on*

non-organic information dominance that will threaten the expeditionary independence of the nation's "Total Force in Readiness."[33] The best defense in this case is a good offense. Capitalizing on a mind-set that encourages innovation and an institutional conviction for combined-arms, the Marine Corps can preserve its expeditionary culture by redefining kinetic and non-kinetic integration. In the process of making those changes, the Corps will establish a new standard for integration across the entire DoD.

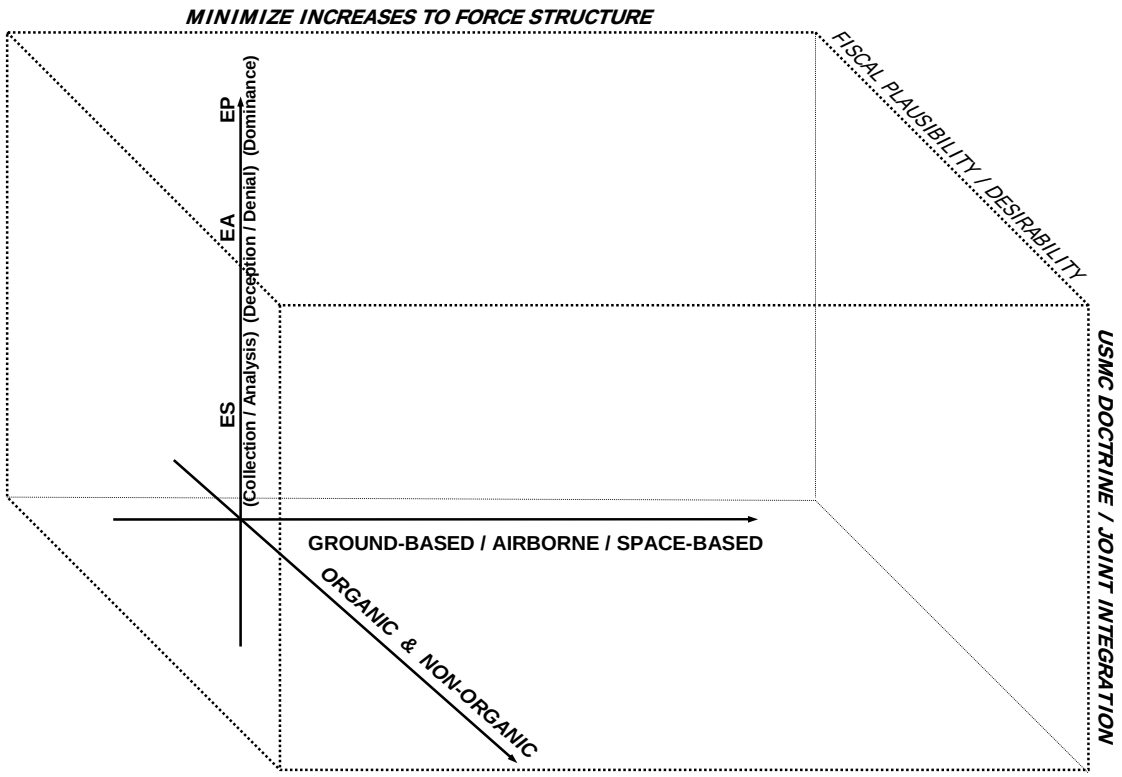

Figure 6 – Three-Dimensional Visualization of the EW Requirement for the USMC

[33] Headquarters United States Marine Corps, Marine Corps Strategy 21, (Washington, DC: HQMC, 03 November 2000), p. 2.

CHAPTER 2 – VISION

INSTITUTIONAL ACCEPTANCE / COMPREHENSIVE CAPABILTY

A vision for the future of Marine electronic warfare revolves around two fundamental themes – *institutional acceptance* and *comprehensive capability*. Institutional acceptance refers to the degree of internalization that leads to an *intuitive understanding* of EW, similar to that which exists already for kinetic combined-arms. Maintaining a comprehensive air-ground capability also contributes to the cultural change because it encourages the development of the most well rounded cadre of EW experts who orchestrate the D3A process. Ironically, while the comprehensive capability is the easiest to understand, it is the institutional acceptance that can bring the most asymmetric advantage to Marine operations at the least cost.

Comprehensive Capability – The Joint Force Multiplier

With a focus towards tactical EA, Marine EW must be capable of manipulating the transfer of information, influencing perceptions, and ultimately managing an adversary's ability to make and act on decisions. EW operations should persuade, coerce, and dislocate targeted audiences; influence, deceive, degrade, or defeat targeted systems; and, protect friendly personnel and equipment from enemy attack. To that end, the Corps must be capable of organically completing the D3A process. *Organic D3A capability*

requires EA, ES, and EP functions performed by ground-based, airborne, and space-based systems which may be organic or non-organic.

The Marine Corps' electronic warfare capability must *apply to all plans and missions*, from major theater war to irregular war to operations other than war. Stated first in the introduction, while ES and EP represent critical enabling functions for EW, the objective of USMC EW must be *tactical EA*. "Tactical" refers to the proximity of sensors to the target, and does not apply to the level of its effects, which can be tactical, operational, and strategic. Proximity is a fundamental characteristic of infantry operations and is crucial to maintaining contact with indigenous populations and to building the cultural awareness so essential to winning the moral battle. Maintaining proximity to the target not only helps to neutralize the inherent sanctuary that LPI technology may have from collection by strategic assets; it also works to minimize the potential for electronic fratricide of friendly and neutral systems. The focus on tactical EW within the MAGTF will drive required ground-, air-, and space-based capabilities.

The technology in which the Marine Corps invests should reflect certain characteristics. The most important quality to invest in is *diversity*. EW from manned and unmanned ground-, air-, and space-based systems capitalizes on the synergy of combined-arms and severely complicates an adversary's ability to defend. Building on diversity, Marine EW systems should reflect a high degree of *interoperability*. Hardware does not have to be the same, but software and data processing should engender a high degree of mutual support between ground-based and airborne systems. The Marine Corps should invest in *open architecture* technology. Open architecture in this case refers to developing the infrastructure that provides additional capacity in order to permit

future expansion as technology evolves. EW systems should be capable of *remote operation and reprogramming*. Remote operation will allow experts to monitor and control equipment that other Marines deploy, thereby enhancing the role of EW in distributed operations. Due to the complexities of collecting and analyzing perishable information, remote operation and reprogrammability will be crucial to seizing fleeting opportunities and to deconflicting electronic fires. In addition to remote reprogrammability, *coupled ES-EA suites* will contribute to deconflicting fires. Sensor-shooter integration will also encourage rapid fires delivery by tying the Decide-Detect-Deliver portions of the targeting cycle to a single system. Finally, the Marine Corps must invest in *scalable* technology. This means that all EW systems can deploy on any-sized MAGTF. It means that larger MAGTFs can have a larger pool of EW assets without denying capability to smaller MAGTF's.

To foster true synergy, EW must be folded into the existing combined-arms structure. Kinetic and non-kinetic actions must be woven into one coordinated effort. Organizational structure should facilitate electronic fires deconfliction and kinetic integration. In order to capitalize on the proximity of distributed forces, EW operations should be conducted by Marines outside of the EW community as well as by experts. Automation and remote operation will encourage wider dispersion of ground EW technology across an AO, maximizing the inherent advantages of ground LOS limitations. This encourages an expanded role for EW that enhances the multi-dimensional presence Marines seek to maintain, particularly in irregular warfare.

EW organizations present a natural center-of-gravity for Information Operations because they control the preponderance of IO-related equipment. For that reason, future

force structure should incorporate disciplines that provide the *intent* for electronic fires. Organizations should reflect EW, PSYOPS, CNO, and linguist skill sets. EW and CNO are the means by which information operations contribute to victory at the physical, mental, and moral level, namely through PSYOPS and MILDEC. Information operations must be integrated with force application to most effectively gain cognitive advantage over any adversary. That integration begins with the efforts of experts.

Finally, the Marine Corps must cultivate a *cadre of EW experts* who understand kinetic and non-kinetic combined arms integration, who are well educated in the mutual support provided by ground and airborne EW, and who internalize the Marine ethos. They will not only facilitate kinetic and non-kinetic fires integration; they will be the Corps' best resource for employing Joint, National, and Coalition (**JNC**) assets in support of MAGTF operations. Second in priority to EW experts, are signals intelligence (**SIGINT**) analysts. A host of JNC organizations will contribute to tactical, operational, and strategic ES. With the anticipated volume of data through which to sift, SIGINT analysis is an expertise that cannot be outsourced.

Together, these initiatives can produce the most potent full-spectrum, combined-arms organization in DoD. But the organization is only as good as its people. It is the institutional acceptance bred by this vision which raises the temperature of the water for any enemy in conventional and irregular war.[34]

[34] Fleet Marine Force Reference Publication (FMFRP) 12-18, Mao Tse-tung on Guerrilla Warfare, 05 April 1989, Samuel B. Griffith, ed. and trans., (Washington, DC: DoN, HQMC).

Institutional Acceptance – The True Asymmetric Advantage

The Marine Corps can embrace Transformation by blending a unique mindset and comprehensive capability with an expeditionary culture that provides freedom-of-action, tactical agility, and strategic flexibility. Institutional acceptance of EW will provide an asymmetric advantage for the Marine Corps when there is an intuitive appreciation for it as one in a continuum of options available to the commander, not merely as a supporting effort to force application. This advantage will be asymmetric because no ally or adversary combines the understanding and the application of EW in this manner. The Marine Corps has the opportunity to take the lead in redefining how electronic fires enable information operations to contribute to achieving political ends.

The requirement for comprehensive EW must come from the consumer, not from the producer (EW community). Marines must recognize the critical role they can play in EW operations, and the critical role EW can play in integrated operations. Commanders must demand realistic training, appreciating the value that "information training" adds, and therefore willing to make sacrifices in physical training in order to drive home the lessons of full-spectrum operations. Policy-makers must adopt an acquisitions model that actively searches for, and willingly invests in solutions that stay ahead of the spiraling growth in the IT market.

Institutional competence will breed confidence in aggressive employment. "Information dominance" will be more than a catchy, feel good slogan. With commanders who appreciate the subtlety of EA as a universally-applicable form of fires, staffs which are capable and determined to integrate kinetic and non-kinetic fires, and Marines who collect, analyze, exploit, and manipulate the EM spectrum through organic

and non-organic means, the Corps will gain a decisive advantage in both the information domain, and in the "commons." Exploiting the free-space transfer of data will offer an informational advantage which negates the spatial requirement to control territory. This will preserve flexibility in the "commons," a critical factor for forcible entry and distributed operations. While many of the essential elements already exist within the Marine Corps, several important recommendations should be pursued in order to transform this vision into reality.

CHAPTER 3 – RECOMMENDATIONS

ACCEPTING AN ETHOS TO PRESERVE CHANGE

At the level of execution, the Marine Corps should capitalize on the pre-existing integration that occurs between Radio Battalion and the EA-6B community by melding both organizations into Marine Expeditionary Force (**MEF**) EW Regiments. As an enterprise, the Marine Corps should create an agile corporate structure within the acquisition framework that capitalizes and accounts for an emerging and often confused set of requirements. Institutionally, the Marine Corps can foster a unity-of-effort which currently does not exist by implementing organizational changes that will facilitate a single vision for Marine EW.

The MEF EW Regiment

Merging Radio Battalion and the EA-6B community into MEF EW Regiments not only creates the potential for better ground and airborne EW coordination; the benefits of formal air-ground integration and community cross-pollination will have impacts well outside of the Marine Corps and DoD (Figure 6). The organization reflects that of an artillery regiment. The EW Regiment would be structured in such a way as to facilitate task-organizing combined ground and airborne EW units that could deploy with subordinate MAGTF's. Based on the assumption that some analytical functions can be conducted within the continental US (CONUS), the preponderance of analysis and

coordination infrastructure would be maintained at the Regimental level, then deployed as necessary. The responsibility for ground and airborne EW *operations* would fall to the Radio Battalion and Electronic Warfare Squadron respectively.

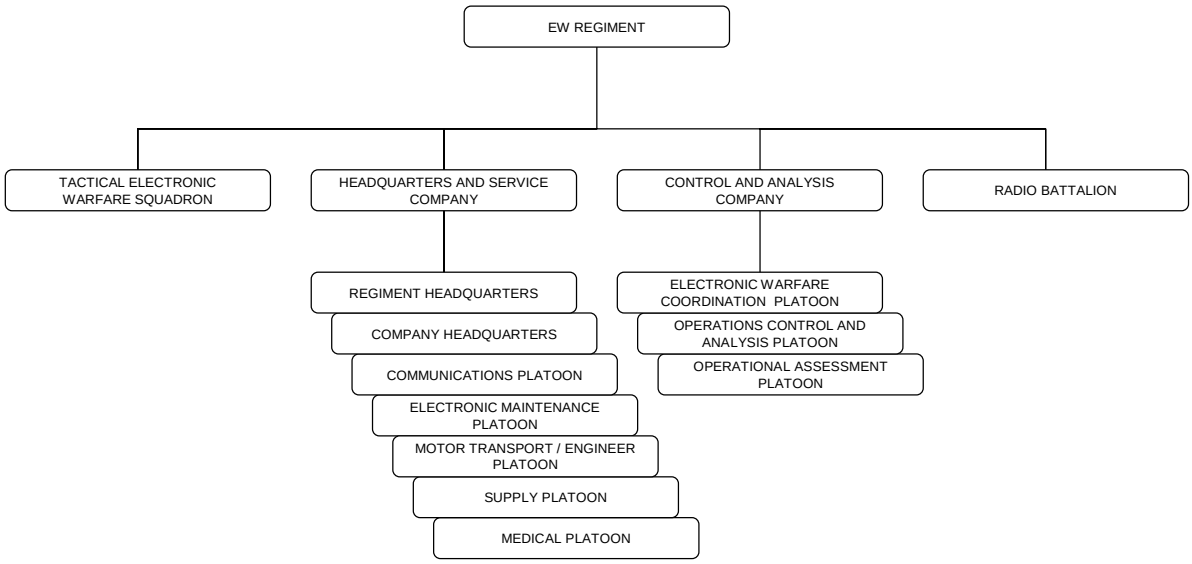

Figure 7 – Proposed MEF Electronic Warfare Regiment

A single organization charged with coordinating ground and airborne EW within the MEF is optimal for non-kinetic fires deconfliction. Electronic fires deconfliction is not completely analogous to that of kinetic fires. While EA is a direct-fire capability, the circular error probable (CEP) for electronic fires can be difficult, if not impossible to measure. EA in the form of net intrusion can also generate second and third order effects felt far beyond the intended target. The traditional tactical, operational, and strategic paradigm does not always apply to EW effects. These factors make simple geographic deconfliction complicated. Using frequency to deconflict is also not an easy matter. With US forces, its allies, and its adversaries exploiting civilian architectures to a greater degree, “danger close” may not be a matter of frequency, but of code or encryption. The

inability to deconflict electronic fires geographically means that separate organizations for ground and airborne EW will be inefficient, counterproductive, and potentially dangerous. For this reason, the Marine Corps cannot allow its aviation and ground EW to continue as separate communities.

The MEF EW Regiment serves several other purposes. It facilitates unity-of-effort. In this case, unity-of-effort applies to a wide range of endeavors, to include planning, execution, and assessment. It also applies to prioritizing service-wide requirements, reviewing doctrine, and integrating training. Moving the preponderance of analytical infrastructure to the Regiment frees the battalion/squadron to focus on execution (Figure 8). This streamlines training requirements within each organization. Viewed as a whole, the Regiment offers unique opportunities for operations, coordination, and analysis. Conscious effort at cross-pollination between the Regiment, the Radio Battalion, and the EW squadron will foster the breadth of knowledge that can overcome the potential lack of depth in specific capabilities.

The EW Regiment creates a Colonel's billet on the MEF staff. A commander on the staff equal in rank to the Intelligence and Operations officers aids in MAGTF integration by facilitating the prioritization of assets between S/G-3 and S/G-2. Currently no Colonel billets exist within the Marine EW community. Radio Battalion personnel have the opportunity to continue in the Intelligence community, but there is no future in the operations field. Creating a small cadre of post-command Colonels will also benefit the EW community as it seeks to enact institutional changes in education and training.

As the cornerstone of EW in an infantry-rich force, Radio Battalion would see changes to its current roles and missions. SIGINT would remain a critical function. In

order to expand the presence of EW (ES and EA) by investing in remotely operable and reprogrammable equipment, Radio Battalion would be tasked to provide the tactical training to augment personnel, and to network those systems for greater coverage and integration. In addition to linguists and EW analysts, PSYOPS personnel would be incorporated into the Table of Organization (**T/O**) to enhance Radio Battalion's IO potential, while CNO personnel would be added to improve its special signals exploitation capability.

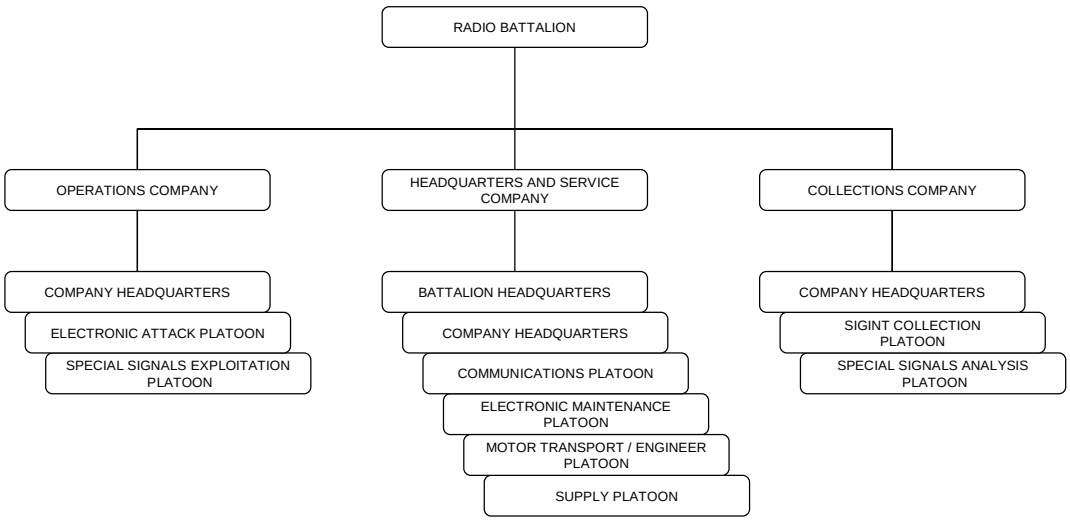

Figure 8 – Proposed Radio Battalion Organization

The future Tactical Electronic Warfare Squadron is the most difficult to quantify without more information regarding future airborne systems. Ideally, each MEF squadron would be a composite organization consisting of individual detachments for separate platforms. An electronic variant of the F-35 Joint Strike Fighter (**JSF**) or the EA-18 Growler could replace the EA-6B in its role of Suppression of Enemy Air Defenses (**SEAD**) platform. But in an irregular war scenario, SEAD may represent a minor EW requirement for the Marine Corps when compared to enemy communications and data transfer systems. For such scenarios, an electronic variant of the MV-22 might

be a more useful resource for the MAGTF. It is organic to every MAGTF, and deploys with the Marines it supports. It also has the available space and lift capability to house required EW equipment. An MV-22 could also carry a complement of EW experts. Those experts – EA, SIGINT, CNO, PSYOPS, and linguist – would reflect the same skill sets seen in Radio Battalion. This is intentional because it facilitates the cross-pollination between organizations, thereby building experts who approach EW holistically – ground, air, space, EA, ES, and EP. Additionally, if the Marine Corps acquires UAV's to conduct EW operations, the composite EW squadron would be a natural home for them.

The MEF EW Regiment would be truly unique in DoD with a robust ground-based and airborne EW complement, and the structure to plan, coordinate, and assess organic/non-organic collections and fires. Married to an institution that demands effects on target, the EW Regiment will be instrumental in managing perceptions, influencing decisions, and manipulating the transfer of information. That kind of an organic capability not only enhances the strength of the MAGTF, it offers a combined-arms EW capability that would be very difficult to match outside of the Corps.

Redefining the EW Acquisitions Paradigm

The requirements and acquisitions process is a very complex issue. The acquisitions community already recognizes many of the unique characteristics associated with procuring information technology and the technology to intercept and manipulate it. Recommending sweeping changes to the acquisitions community lies beyond the scope of this paper. However, one recommendation deserves mention. Marine Corps Systems Command (MCSC) should be designated the lead agency with regards to MAGTF IO

procurement.[35] One method of ensuring continuity across IO is to create a Program Group – PG-17 – that would coordinate Marine acquisitions for all IO core competencies. This program group would also be the lead agency to coordinate with the service acquisitions communities, to include NAVAIR, which currently controls the EA-6B program (PMA-234). PG-17 would also coordinate with organizations within MCSC, namely Information Systems and Infrastructure (PG-10), Armor & Fire Support Systems (PG-14), and Intelligence Systems (PMM-123). So the purpose of PG-17 would not be to control all acquisitions, but to act as the unifying coordinator for all EW acquisitions.

Single vision ~ Unity-of-effort

No single solution will fix the shortcomings of EW within the Marine Corps, but working towards a single vision cannot be overemphasized. In fact, since the nature of the problem spans so many areas of expertise (acquisitions, doctrine, training and education, policy, joint/interagency integration), identifying an "EW Czar" may be impossible. But Marine EW requires a focus-of-effort that does not exist at this time. The Radio Battalion and EA-6B communities train, equip, and operate as separate organizations even though their "fires" can rarely be deconflicted geographically. Several positive steps have already been taken toward this single vision.

The Information Operations and Space Integration Branch (**PLI**) at Headquarters, Marine Corps Plans, Policies, and Operations (**HQMC PP&O**) Strategy and Plans

[35] MCSC's mission is to, "serve as the Commandant's principal agent for acquisition and sustainment of systems and equipment used by the Operating Forces to accomplish their warfighting mission." MCSC homepage at http://www.marcorsyscom.usmc.mil/. Website accessed on 10 April 2005.

Division serves as the focal point for Marine Corps IO plans and policies.[36] PP&O (PLI) is in the process of developing a vision and corresponding roadmap for Marine EW. To those ends, PLI chairs the USMC EW Working Group and participates in such organizations as the Office of the Undersecretary of Defense for Acquisitions, Technology, and Logistics (OUSD [AT&L]) EW Roadmap Integrated Product Team (IPT), the Information Operations Executive Committee, and Airborne Electronic Attack System-of-Systems Joint Concept of Operations Working Group (AEA SoS J-CONOPS WG). Additionally, PP&O (PLI) maintains close contact with US Strategic Command (USSTRATCOM) – the lead DoD agency for Information Operations.

The Marine Corps Combat Development Command (**MCCDC**) is reorganizing. Among the most far-reaching changes is the creation of *capability stewards* (Figure 9).[37] Each capability steward will have cognizance over Doctrine, Organizations, Training, Material, Logistics, Personnel and Leadership, and Facilities (**DOTMLPF**) functions.[38] As of the printing of this paper, the capability steward in charge of Information Operations and Electronic Warfare has yet to be determined. IO and the core capabilities of EW, CNO, PSYOPS, and MILDEC belong with the "Fires and Maneuver" capability steward. While there is functional overlap, information functions as both a maneuver

[36] The dual mission of PP&O is to serve as, "the focal point for the interface between the Marine Corps…and the joint and combined activities of the JCS and the unified Commanders-in-Chief;" while also being, "responsible for coordinating the development and execution of service plans and policies related to the structure, deployment, and employment of Marine Corps forces in general." Information regarding PP&O (PLI) comes from multiple discussions with Maj Shawn Cunningham, the Joint IO Action Officer.
[37] Details of this reorganization come from two interviews with Col Blasiol (05 May, 2005) and Dr. Bailey (03 May, 2005).
[38] Doctrine, Organization, Training, Material, Logistics, Personnel & Leadership, and Facilities. "Cognizance" in this case is not control. Within CD&I, capability stewards would be directly responsible for doctrine, organization, and personnel, while Training and Education Command (TECOM) would be responsible for training and leadership. Outside of CD&I, capability stewards would coordinate with MCSC and PNR for material, logistics, and facilities functions. Col Blasiol interview, 05 May 2005.

element and as a form of fires. Folding EW into the "Fires and Maneuver" capability steward will also facilitate integration with physical maneuver and kinetic fires.

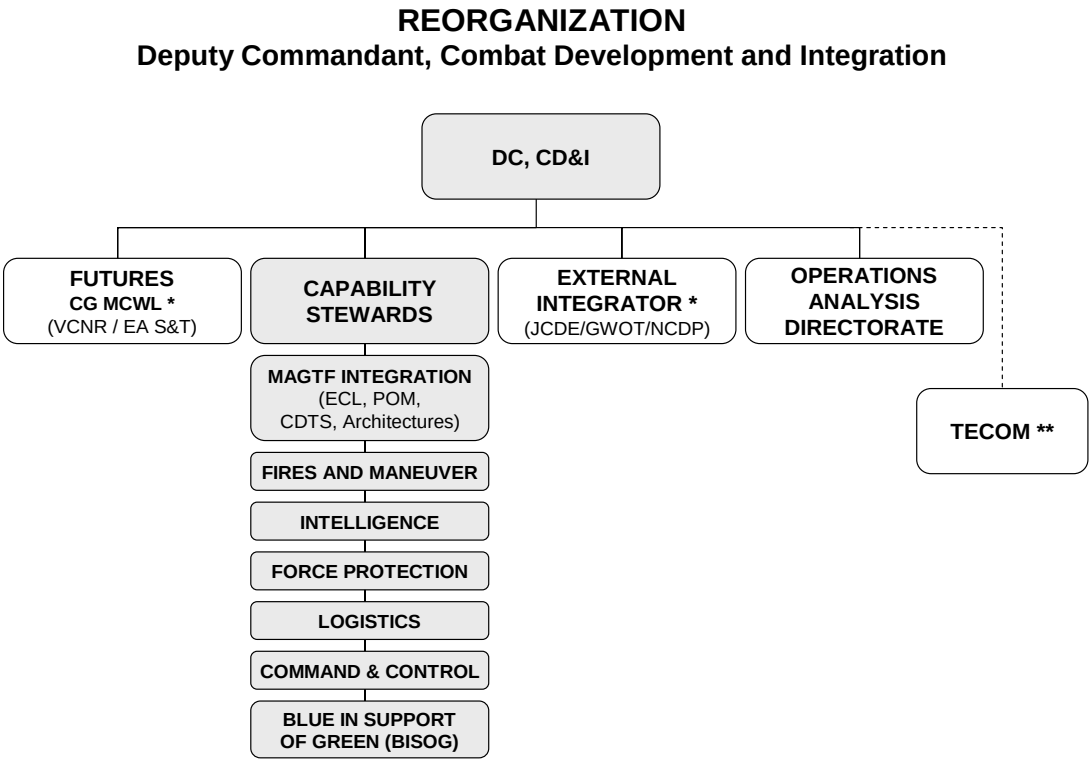

Figure 9 – MCCDC Reorganization[39]

No integrating concept exists for either IO or EW, yet both are fundamental to STOM and DO. Once IO and EW are assigned a capability steward, *IO and EW integrating concepts should be developed* with the assistance of PP&O (PLI).

In addition to integrating concepts, CD&I should re-evaluate the method by which EW doctrine is published. Returning to the artillery analogy, while specific artillery warfighting publications exist, the integration of artillery into a scheme-of-maneuver is incorporated in the comprehensive publications that apply to and are read by a host of occupational specialties. In the same manner, EW must be incorporated into those

[39] Slide used by the authority of MCCDC Studies and Analysis Division. Dr. Bailey interview, 03 May 2005.

publications that are relevant and widely read. Printing separate EW publications hinders EW education across the service if Marines do not see how it should be integrated as a function. Electronic Warfare is very briefly mentioned in MCWP 3-16, Fire Support Coordination in the GCE, yet EW is a form of fires.[40] The term "electronic warfare" is included as a function of Marine aviation, but it is not even defined in MCWP 3-1, Ground Combat Operations. Still, as a form of fires, EW must support ground combat operations.[41] The term "electronic warfare" does not appear once in MCWP 3-40.2, Information Management, even though EW is an active and passive means of collecting, exploiting, and manipulating information requiring an aggressive plan to deconflict with friendly use of the EM spectrum.[42]

Summary of Recommendations

Working backwards from the top down, the Marine Corps must have a single vision for EW. With its location in the National Capital Region, its charter to both develop policy and to ensure that policy is integrated with the rest of DoD, and its current initiatives to produce a vision and roadmap, PP&O (PLI) should remain the focal point for a single USMC EW vision. PP&O (PLI) must maintain a close relationship with the Fires and Maneuver capability steward, who should be responsible for EW DOTMLPF. Creating an IO program group – PG-17 – within MCSC will facilitate unity-of-effort for USMC EW acquisitions, working to procure equipment that meets the requirements

[40] Marine Corps Warfighting Publication 3-16, Fire Support Coordination in the GCE, (N.p., November 2001).

[41] Marine Corps Warfighting Publication 3-1, Ground Combat Operations, (N.p., November 2002).

[42] Marine Corps Warfighting Publication 3-40.2, Information Management, (N.p., January 2002).

outlined in Chapter 2. Finally, at the level of execution, a MEF EW Regiment will provide the benchmark for integrated EW operations across DoD. Integrating ground and aviation capabilities with its analytic and coordination elements, the Regiment will task-organize combined-arms units to deploy with any-sized MAGTF. The organizational cooperation of ground and air EW will also improve kinetic and non-kinetic integration, producing greater overall synergy in any operation and validating the organic interdependence and inherent flexibility of the MAGTF. Yet, with every solution, there are obstacles. This paper would not be complete without addressing some potential roadblocks to successful implementation of this vision.

CHAPTER 4 – OBSTACLES

INERTIA: THE PATH OFT TRAVELED

The vision of a minority means little without the support of the majority who will act to turn that vision into reality. *Inertia* stands in the way of progress. Marines look back upon a long tradition of innovation, proud to have taken the path less traveled many times.[43] Still, like Cerberus at the gate to Hades, the *DoD*, and two of our own *institutional biases* can impede the path to change.

External – Department of Defense

In a strange twist of irony, the subtlest threat to a comprehensive D3A capability could come from an organization that would benefit tremendously from it, the Department of Defense. Getting back to a point made in the introduction, Marines are compelled to defend the qualitative advantages of the MAGTF's combined-arms nature only to those who have not witnessed it in action. The *integration* of fire and maneuver from the ground, air, and sea *under one command* presents an overwhelming power greater than the sum of its components. A more potent MAGTF may be perceived as diverging from the DoD's efforts to increase "jointness."

While finite budgets, limited bandwidth, and difficulties establishing concrete metrics of performance may be cited as rationales against full DoD cooperation, the

[43] Based on Robert Frost poem, "The Road Not Taken." Poem found online at Everypoet.com website at http://www.everypoet.com/archive/poetry/Robert_Frost/robert_frost_the_road_not_taken.htm, accessed 18 May, 2005.

perception of a threat to jointness may underlie the surface arguments. Championing a unique capability like a fully integrated, task-organized, air-ground EW Regiment runs the risk of undermining the Marine Corps' expeditionary culture if opponents of the MAGTF's independence perceive an additional threat to their quest for jointness. The reality is that continuing along the current path will only foster a dependence on joint resources *and expertise* that will limit the Corps' ability to perform the niche capabilities it advertises such as forcible entry operations.

Internal – Institutional Myopia

Institutional inertia may begin within the EW community itself, as Marines misunderstand the intent behind the emphasis on *tactical EA*. Some within the Radio Battalion community may view this mind-set as a challenge to their historic relationship with the Intelligence community writ large. While it is an independent organization within the MEF, Radio Battalion is considered by many to be an intelligence asset. MCRP 5-12D states, "during operations the radio battalion or its task-organized SSUs are under OPCON of the MAGTF commander, who exercises this control through the G-2/S-2."[44] The preponderance of signals intelligence (**SIGINT**) will come from theater-level and national assets. Marine tactical SIGINT offers an important capability that strategic sensors do not provide. But Marine ground-based *EW* must not be considered an *ES* asset.

Several stark realities combine to complicate the efforts of those innovators who seek to redefine EW within the Marine Corps. A difficult, yet fallacious position argues

[44] Marine Corps Reference Publication 5-12D, Organization of Marine Corps Forces, ,(N.p., October 1998), p. 6-7.

that the overwhelming success of the Marine Corps in recent operations reinforces the validity of the status quo. The global explosion of IT has not filtered down to many of the undeveloped and underdeveloped regions of the world to which Marines deploy. That situation will change over the next decade. Recognizing the problem in the future will be too late.

The success of EW can be difficult to accurately assess. Good effects on target may lead to *acts of omission*, not commission, thereby complicating one's ability to develop quantifiable *metrics of performance*. The more subtle and covert the means of intrusion, the more effective the intrusion becomes since the target is less likely to recognize that he is under attack. Ironically, the subtler the intrusion, the more cooperative the target, but also the more difficult that effect is to quantify at the time of intrusion. Perhaps the more frustrating issue dealing with metrics is that one cannot memorize and apply quantification tables to *any* system that targets the human will. As mentioned before, the artillery round makes a pretty explosion, but offers no empirical means of demonstrating its effect on *eroding the will* of an enemy. The argument returns to the inconsistencies between NCW and 4GW stated in Chapter 1. NCW breeds a passion for metrics, yet those metrics do *not* truly relate directly to the actual target – human will. If the Corps plans to commit itself to irregular warfare requires Marines it must overcome the inclination (inertia) to prioritize acquisitions based on the ease by which one can observe physical effects.

Though electronic fires represents a critical means of conducting operations at the moral level, investing in EW ultimately relies on a leap of faith from which the introduction receives its title. Marines need to recognize that operations at the moral

level make quantifiable measures of effectiveness just as impractical for kinetic fires as it is for non-kinetic fires. To further complicate the issue of "tangible" metrics, how does one measure synergy? Synergy is fundamental to the strength of the MAGTF, yet one cannot do more than hazard estimates at the impact of it on the battlefield. That very problem plagues the Marines who must defend the self-sufficiency and independence of the MAGTF to those who have never witnessed one in action. One must hold an intangible and emotional conviction in the multiplicative effects of synergy in military operations. It is that indefinable element that leads us back to the challenge posed in the first page of this paper.

CONCLUSION

GREASING THE SILENT WHEEL

We end this journey where we began. Ultimately, the strength of this paper hinges on the intangible, yet unshakable belief that the integration of capabilities provides a multiplicative effect that cannot be quantified, but is crucial to success. The success of the MAGTF rests with the cadre of experts who harvest the institutional appreciation for combined-arms and who harness the capabilities of its organic aviation and ground assets through integration. The acumen they develop for their trade enables them to further increase the power of combined-arms integration by acting as the linchpin to leverage Joint, National, and Coalition resources. But that acumen has a cost. The Marine Corps must invest in a comprehensive air-ground capability, lest it lose not only the resources but also the expertise that comes with it. The silent wheel must be greased before it squeaks, for if it does squeak we will be too late.

In order to preserve its expeditionary culture, the Marine Corps must embrace Electronic Warfare *institutionally*, while maintaining a *comprehensive EW expertise* which organically completes *D3A*, yet leverages non-organic resources in order to manipulate the transfer of information, influence perceptions, and affect an adversary's ability to make and act on decisions. Comprehensive means maintaining organic ground, airborne, and space-based systems capable of conducting EA, ES, and EP. These

capabilities will foster the required breadth of EW expertise to leverage the range of non-organic resources that will likely equate to a majority of the Corps' EW effort.

While the Marine Corps continues to validate its reputation as the nation's premier total force-in-readiness, it cannot get complacent. Capitalizing on its service-wide commitment to innovation, the Corps has the opportunity to establish the standard for kinetic and non-kinetic integration. This opportunity will not only set the bar for the rest of DoD, it will address the inconsistencies that undermine the success of emerging doctrinal concepts and thereby help to preserve its expeditionary culture.

Remember, while the focus of this paper is Marine Corps electronic warfare, *EW is only part* of a solution to solve the inconsistencies that will undermine the success of the Corps' future warfighting initiatives. In fact, the recommendations of this paper will not fully resolve the limitations of Marine EW, but will add to other initiatives already identified within the EW community.

Ultimately the fundamental challenge to the leadership of the Corps is not creating a cadre of experts, or building a comprehensive capability. Instead, it is cultivating an institutional awareness and appreciation for the synergy that integrated physical and information operations can generate at the moral, mental, and physical levels of war. Recognizing the intangible benefit of combined-arms integration, the Marine Corps can apply its wisdom, capitalize on the inherent strengths of the MAGTF, and offer the United States another unique and powerful capability for its arsenal of democracy. It is the responsibility of the Corps' leadership to recognize the threat to their service's expeditionary ethos, and to commit to institutional change in order to turn that vision into reality.

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